

ASHRAE TC 6.9 – Thermal Storage
General Meeting Minutes
Monday, June 26th, 2023
4:00 – 6:00 PM EST
Tampa, FL

Attendees

Attendees included:

<i>Name</i>	<i>Committee status</i>	<i>Officer role</i>
Farzin Rad	VM	Chair
Daniel Pyewell	VM	Vice Chair, Secretary, Webmaster
Guy Frankenfield	VM	
Ken Fulk	VM	
Amy Van Asselt	VM	
Henry Becker	VM	
Aaron Farha	G	
Kate Rivera	G	
Min Che	G	
Sarp Hamamcioglu	CM	
Bruce Lindsay	CM	
Paulo Tabares	CM	Research Subcommittee Chair
Jason Woods	CM	
Kyle Gluesenkamp	CM	
Mike Filler	CM	
John Nix	VM	ALI Coordinator
Sandra Boetcher	CM	
Paul Steffes	CM	
Chi Lui	PCM	
Lingnan Lin	PCM	
Ian Cavanaugh	G	
Ransisi Huang	PCM	
Ivan Thomas	CM	
Mark MacCracken	CM	
John Aykroyd	G	
Getu Hailu	G	
John Dunlap	VM	
Doug Reindl	CM	
Blake Ellis	CM	Standards Subcommittee Chair
Deba Maitra	G	
Trent Hunt	CM	
Wayne Borrowman	G	
Emishaw Iffa (online)	CM	
Chuck Booten (online)	VM	
Andrew Fix (online)	PCM	
Brent Kovash (online)	CM	
Geoff Bares (online)	CM	
John Andrepont (online)	CM	
Joseph Rendall (online)	PCM	

Reda Djebbar (online)	G	
Richard Brooks (online)	VM	Program Subcommittee Chair

G: Guest

PCM: provisional corresponding member

CM: corresponding member

VM: voting member

Preliminaries

- i. 4:04 meeting called to order
- ii. Roll call and ethics commitment
- iii. Quorum and roll call. **Quorum is established** with 7 in room and 2 remote, out of 10 (also see update later in meeting at 4:22).
 - a. Two VMs are set to roll on from same company – will need to make request to Tara to correct this. **Action item:** Farzin and Daniel will follow up with Tara.
- iv. Announcements by Chair:
 - a. Task force for decarbonization will continue another year
 - b. Want to track international members, which we will need to update on our sign in sheet

Approval of Minutes

- i. A motion to approve the prior meeting minutes was made by Guy, seconded with Daniel. **Motion passed 9-0-0-1 CV.**

Liaison Reports

Training and Education Committee – John Nix

- There is a course on thermal storage which was updated to include TES with renewable energy. Instructor is Doug. Has been at least two years since the course was last held at a conference, was last done in Chicago. We might consider doing it again for Chicago. Trend for e-learning, and offer courses both in-person and online. There are three types
 - o Online, instructor-led (live)
 - o E-learning
 - o Participation courses

4:22 PM additional VM arrives, for a **quorum of 10 out of 10 VM present** (8 in person, 2 remote).

Continuing with Training and Education Liaison Report:

- Bruce notes that the IRA tax credits are driving a lot of recent interest. Incorporating this into the training would be valuable.
- Mike Filler notes that any updates to 90.1 to incorporate TES would be important to incorporate into the course.
- Course instructor Doug R. reports that the 3 hr online version was June 1, with only 7 attendees

- More aggressive promotion may be needed.
- Topics to add: storage for heating, decarbonization, electrification
- A way to bring in more participants is noting that codes will begin incorporating TES.
- 2.5 global climate change – no updates

Handbook – Navin Kumar

- A draft was prepared that will need to be reviewed by early August.

Programs – Bruce Lindsay

- a. Last meeting – Atlanta
 - i. In Atlanta, we had 7 sessions on TES – 6 in ASHRAE and 1 in AHRI Expo.
 - ii. The 3 best attended technical sessions were all TES
 - iii. IRA is giving 30, 40, or 50% tax incentives
- b. This meeting – Tampa
 - i. 3 were submitted for Tampa. 1 was accepted, 1 was accepted late, and 1 was rejected.
 1. SEM 50, Tuesday
 2. SEM 56, Wed 8 am
- c. Next meeting – Chicago
 - i. 3 sessions being submitting for Chicago
 1. 30 years of TES
 2. DOE and national labs, TES consortium (Sven chair)
 3. Thinking outside the box with 40% tax credit for TES
- d. Brent proposes that there be a presentation on Energy Plus. Emishaw notes that there is work ongoing to adapt Energy Plus to model thermal storage in buildings (potential topic for Indianapolis)

Standards – Blake Ellis, and John Dunlap

- a. 150 was reformed to create a more usable standard. Meets remotes once a month, chaired by Chuck Dorgan. Will include 3 methods of test:
 - i. Method 1 latent
 - ii. Method 2 sensible – further along as of today
 - iii. Method 3 (the original version)
- b. SPC 233P material performance standard for PCM
 - iv. Made request in Atlanta for additional members. Additional members were obtained. More info to come in Chicago.
- c. Other relevant standards from other organizations
 - v. AHRI 900 (2022 reaffirmed, no change from 2015)
 - vi. ASME safety standards, TES 1, TES 2
- d. Seeking liaison to 90.1
 - vii. Rick Heiden from 90.1 notes that 90.1 is considering adding requirements on thermal storage. Rick notes that normally a liaison would be from the TC, and would join the 90.1 meeting to provide liaison reports, to the Saturday meeting twice a year, plus some mid-cycle meetings.

- viii. Amy volunteered to serve as a TC6.9 liaison to 90.1
- ix. Mike Waite notes that, in 90.1, there's a need to show cost effectiveness. Analytical tools to show that would be helpful.

TAC liaison Doug Reindl:

- o ASHRAE created new standing committee called GTech (Global technology interaction), and update from ISI International Standards Interaction committee.
- o Certificate of Appreciation was awarded from TAC to Farzin for his service as TC chair of 6.9

Research – Paulo Cesar Tabares Velasco

- a. RTAR (Xiaobing), on ground source HPs with thermal energy storage, submitted last year was approved by RAC with comments, now moving forward with a Work Statement (WS)
 - i. Volunteers are needed to develop the WS. One person volunteered to help.
 - ii. August 15, 2023 is next deadline to submit a WS
 - iii. December 15, 2023 is the following deadline to submit a WS. This would be the target for the first draft of the WS.
 - iv. May 15 2025 is last possible deadline to submit a WS.
- b. Draft RTAR (Sandra) on compact modulus TES HX
- c. Another idea on metrics for TES.
- d. Another idea is on defining round trip efficiency John Andreponete notes this could be a good seminar (to be noted by Bruce as program ideas).
- e. A folder called "Research" was created in the basecamp for TC 6.9

Long Range Planning/Website – Farzin Rad

- o Der-vet is a software being developed as part of ESIC energy storage integration council, headed by EPRI. It compares different types of energy storage systems. Started with batteries, but now expanding to include TES. Hasn't been done yet, but beginning the process.
- o Build back better, now known as IRA inflation reduction act, the incentive is out there and the tax form to use if you have an owner applying for the incentive, the IRS form is 3468. The owner needs to apply to get the incentive.
 - Available through 2024, and perhaps beyond that.
 - The incentive value is based on the total project, not just the tank. Includes interconnected piping, soft costs of engineering, etc. are all included in the total project cost.
 - There are different levels of incentive. As little as 6%, but increases with additional factors, such as using prevailing wage labor (to 30%). It's a tax credit to the owner paid out over a period of time. It's a credit, not a deduction. For a tax-exempt entity, a direct check from the IRS can be obtained.
 - For projects under 1 MW electric (~400 ton chiller), it's 30%
 - For projects over 1 MW, need to use prevailing wage

- Another 10% add if domestically produced equipment
- Another 10% added if in a “carbon challenged” area that will be hurt by carbon reduction measures (e.g. places with coal mining or power plants)
- This will be covered in the Seminar 50 Tuesday at 11 am.
- MOP
 - Update was released just before Atlanta

Honors and Awards – Blake Ellis

- Andrew T. Boggs service award – Bill Bahnfleth
- Reminder that Hightower award is given for service to TCs over last 4 years
- Many awards have due dates of Dec 1

Old Business

- None

New Business

- TPS description (Paulo). Paulo notes that the description of the scope could be made more exciting. Paulo will post to basecamp and get feedback within the next few weeks.
- Mike Filler recommends having a liaison to standard 240P, measuring carbon emissions of buildings. Mike Waite notes it’s a standard for quantifying life cycle carbon emissions in buildings (embodied and operational carbon). Mike Filler notes that RP1607 (2017) helped show the value of TES to increase the ability of the grid to support renewable generation.

Adjourn

meeting was adjourned at 5:56 PM.

Appendix 1 – chat comments in the online meeting during main committee meeting

Chat comments:

from Brent Kovash to everyone: 2:43 PM
 for those online... The closed captioning option is helping a little bit to decipher what is being said.

from Reda Djebbar to everyone: 2:46 PM
 Good idea Brent

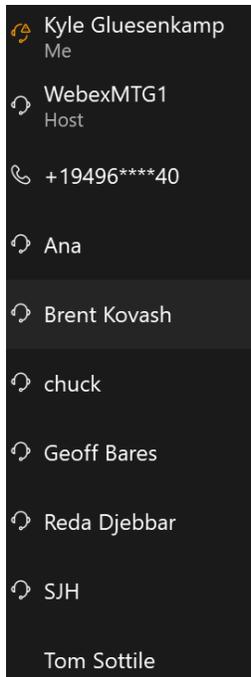
from Reda Djebbar to everyone: 3:43 PM
 What is the status of ASHRAE thermal storage standards such as 94.1 and 94.2

from Brent Kovash to everyone: 3:52 PM
 I'd agree with the question on 94.2

from Geoff Bares to everyone: 3:54 PM
I'm pretty sure both of them have been withdrawn.
from Reda Djebbar to everyone: 3:58 PM
Okay Geoff- Were they replaced with other standards ASME/ANSI....
from chuck to everyone: 4:16 PM
approve
from chuck to everyone: 4:17 PM
ay
from chuck to everyone: 4:17 PM
aye i should say
from Geoff Bares to everyone: 4:18 PM
have to drop, be back in a few
from Brent Kovash to everyone: 4:29 PM
the draft isn't in basecamp if it's supposed to be.
from Kyle Gluesenkamp to everyone: 4:30 PM
Brent, I think in the subcommittee meeting someone said it would be uploaded to basecamp
this afternoon. I don't remmber who said that...
from Phil to everyone: 5:06 PM
I don't know how to sign in but hopefully I will be included as a continuing corresponding
member. Phil Trafton
from Reda Djebbar to everyone: 5:07 PM
Same here - Please advise on how to became corresponding member.
from chuck to everyone: 5:28 PM
i need to drop off
from Reda Djebbar to everyone: 5:32 PM
Need to drop off -Thank you.
from Kyle Gluesenkamp to everyone: 5:36 PM
regarding the membership questions: you can join as provisional corresponding member by
going to ashrae.org/joinatc
from Kyle Gluesenkamp to everyone: 5:37 PM
to be converted from PCM to corresponding member, the TC chair will need to convert you
during the annual roster update (typically in early February)

Appendix 2 – subcommittee meeting minutes

TC 6.9 subcommittee meeting, Monday June 26, 2023, 2:15 PM, Tampa, FL
In person attendance was perhaps not recorded for the subcommittee meeting.



online participants : Chuck is Chuck Booten. SJH is someone with different initials from Ontario.

Meeting called to order 2:18 PM, introductions

Standards subcommittee report (Blake)

- Standards for which TC6.9 is the cognizant TC:
 - o SPC 150 (reaffirmed 2019) (Chuck Dorgan, chair) – MOT of performance of cool storage systems. Got TPS change approved. Meeting monthly, not meeting in Tampa. MOT for latent, and a MOT for sensible, plus a third method (the existing test procedure). Sensible committee finalized a draft. Next steps will be: vote on it as SPC then out for public review.
 - o SPC 233P (Navin Kumar, chair) – testing and evaluating reporting of PCMs. This was authorized Nov 2021. Committee added members. Expecting more updates in 2024 Winter meeting in Chicago.
- Other standards of interest to 6.9
 - o ANSI/AHRI Standard 900 (written 2015, reaffirmed 2020)
 - o ASME TES committee focused on safety standards. “TES 1” safety standards was published. 2nd edition 2023. “TES 2” is a group being formed for high temperature PCM. Also: performance test codes 53 committee for mechanical and thermal storage, PTC draft expected mid-2023.
- Discussion around 90.1 – Brandon Damis (sp?) is on 90.1 mechanical subcommittee, interested to liaise between the two committees.
 - o Mechanical group meets all day Friday, Saturday afternoon, Sunday afternoon. Full committee Sunday morning, Monday morning.
 - Good times to introduce TES language/ideas:
 - Saturday morning meeting is when the subcommittee liaisons report.
 - Afternoon breakouts (Fri, Sat) would be a good time to introduce TES liaison. May also be possible Sunday afternoon. Hydronic working group may also make sense.
 - The monthly hydronic subcommittee meeting.

Program subcommittee report (Bruce)

- TC6.9 had 7 sessions in Atlanta. Top three highest attended sessions were all TES!
- 3 were submitted by TC6.9 for Tampa, 1 was accepted, then the 2nd received late notification of approval.
 - o (accepted) IRA and tax credits for TES will be Tuesday 11 am, Farzin chair
 - o Leveraging IRA for cost savings, Wed 8 am, Mike chair
 - o TES and HVAC to enable decarbonization (proposed by DOE and national labs) plan to resubmit for Chicago.
- Other programs of interest in Tampa, not 6.9-sponsored:
 - o One yesterday on TES and resilience,
 - o Recent publication on resilience and storage systems in hot and humid climates US Army and US Corps of Engineers
 - o In Tampa: electrification strategies for decarb in NYC, Tue, 3:15
 - o In Tampa: Optimization of building controls, Tue 8:00 am
- Submissions for Chicago (winter 2024):
 - o Showcasing two unique projects in Chicago for district cooling: McCormick Center (chilled water) and Centrio ice storage near Sears Tower.
 - o Resubmit the DOE/labs session
 - o Daniel notes that Ibrahim Hesham is interested to speak on projects in Dubai/ Middle East, and that Geoff Bares is getting in touch with him for T.C. 6.2 programs
- Submissions for Indianapolis (summer 2024):
 - o Changes to 150, if it is finalized by then

Handbook subcommittee updates (Navin chair, unable to attend today)

- Draft will be posted on basecamp this afternoon. Additional volunteers are sought to serve as reviewers or authors of the handbook chapter. Guy volunteered to review.
- Brent Kovash notes that some updates were made, which will appear in the latest draft.
- Deadlines
 - o A vote will be needed in next few weeks. **Action item:** Farzin and Daniel to check with Navin and coordinate a remote vote before the deadline.
 - o Clarity needs to be found regarding deadlines. Brent notes that Navin indicated we need to finalize the chapter by August. Atlanta minutes note August 8.
- Henry recommended including an advisory statement regarding the importance of water quality, and biochemical makeup, the potential for problems to arise over time that are extremely expensive to correct. **Action item:** Henry to provide some language to Farzin and Navin for inclusion in the handbook chapter.

Research subcommittee updates (Paulo)

- No active projects or work statements (WS)
- RTAR was submitted, cosponsored with 6.8 – residential ground source HPs with TES
 - o Xiaobing (ORNL) and Harrison (NIST) are co-authoring
 - o RTAR was approved by RAC, with comments. Asking to narrow scope and budget, since it is modeling and simulation. Will incorporate feedback into the WS
- RTAR just submitted – compact modular TES HX (Sandra authoring)
 - o Study on additively manufactured compact HXs. Project objectives: optimized prototype HX through numerical and experiment testing, and evaluation and enhancement of additive techniques for composite materials with improved properties for TES.
 - Some folks volunteered to help support the writing of this RTAR (incl Chuck, Paulo, Amy, and ?)
- Uploaded materials to basecamp

- Future research proposal ideas:
 - o Metrics for energy savings from TES
 - o Quantifying benefits from TES (Chuck notes that there is ongoing effort towards this at the national labs, funded by DOE)
- Farzin notes there were a couple publications which fall under the research subcommittee
 - o Design guide for cool thermal storage. From ~2019
 - o Another one dates back to ~1996, "Cold Air Distribution Guide"
 - Bruce notes that a quick way to update it is focus on DOAS, colder air distribution with downsized ductwork and fans, chilled beam.